SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL

RADIOACTIVE MATERIAL LICENSE

Pursuant to the Atomic Energy and Radiation Control Act, Section 13-7-40 et. seq. of S.C. Code of Laws of 1976 as amended and Supplements thereto, and the South Carolina Department of Health and Environmental Control Regulation 61-63 Radioactive Material Title A), and in reliance on statements and representations heretofore made by the applicant, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer radioactive material listed below; and to use such radioactive material for the purpose(s) and at the place(s) designated below. The license is subject to all applicable rules of the South Carolina Department of Health and Environmental Control now or hereafter in effect and to any conditions specified below.

Amendment No. 47 amends

LICENSEE	3. License Number
1. Name Chem-Nuclear Systems, LLC Barnwell Waste Management Facility A Subsidiary of Waste Management, Inc.	097 in its entirety
2. Address P.O. Box 726 Barnwell, S.C. 29812	4. Expiration Date July 31, 2000

5. Radioactive Material (Element and Mass Number)	6. Chemical and/or Physical Form	7. Maximum Radioactivity and/or quantity of material which licensee may possess at any one time.
A. Any radioactive material excluding source material and special nuclear material	A. Dry packaged radioactive waste except as authorized in this license.	A. 50,000 curies
B. Source material	B. Dry packaged radioactive waste except as authorized in this license.	B. 60,000 pounds
C. Special Nuclear Material	C. Dry packaged radioactive waste except as authorized in this license	C. 350 grams total of ^{235}U or 200 grams of ^{233}U or 200 grams of plutonium or any combination of these provided the sum of the ratios of the quantities does not exceed unity.

8. Authorized Use:

A., B. and C.

Radioactive material as low-level radioactive waste may be received, stored, and disposed of by shallow land burial. The licensee shall not receive an annual volume of more than one million, two hundred

thousand (1.2 million) cubic feet of waste per calendar year; however, the licensee is authorized to increase the volume in ten (10) per centum increments; provided that the Department is notified in writing no later than thirty (30) days in advance of such increases.

Unless otherwise authorized by the Department, only radioactive waste consigned for burial shall be received at the location specified in Condition No. 9 of this license. The maximum radioactivity and/or quantity of radioactive material indicated in Item 7. A, B, and C applies to the above ground activities.

General Conditions

9. Unless otherwise specified, the authorized place of use is a site located approximately five miles northwest of Barnwell, South Carolina, in the Seven Pines School District, Red Oak Township, Barnwell County, South Carolina within the boundary of the land area described in Lease agreement dated April 6, 1976, as amended.

10. The licensee shall comply with the provisions of Department Regulation 61-63, Radioactive Material , (Title A), Part I - General Provisions; Part II - Licensing of Radioactive Materials; Part III - Standards for Protection Against Radiation; Part VI - Notices, Instructions, and Reports to Workers; Inspections, and Part VII - Licensing Requirements for Land Disposal of Radioactive Waste; Department Regulation 61-83, Transportation of Radioactive Waste Into or Within South Carolina.

11. Unless otherwise specified in this license, the licensee shall make no changes in the internal safety audits, Safety Review Board, ALAR.A Review Committee, Site Criteria, or Procedures governing these specific activities without approval from the Department.

12. Operations authorized by this license shall be conducted in accordance with Chem-Nuclear Systems, Inc. procedures and subsequent revisions and additions approved by the Department. However, the licensee may upon notification to the Department but without Department approval, make minor changes to these procedures provided that:

A. The change does not affect requirements of any other license condition in this license;
B. The change does not increase the potential for personnel exposure;
C. The change does not diminish operational safety;
D. The change does not increase the potential for release of radioactive material to unrestricted areas; and
E. The change does not reduce the licensee's record keeping and reporting system.

The licensee shall maintain records of these changes including evaluations which provide the basis for the change.

13. The licensee shall ensure that all site personnel have satisfactorily completed the training program requirements as specified in the Chem-Nuclear Systems, Inc. Barnwell Site Training Program. Changes and additions to the program shall be submitted to the Department for review. Time intervals for personnel indoctrination, training, examinations, certification, retraining specified in Procedure S20-AD-004, "Barnwell Radioactive Waste Burial Site Personnel Training" shall not be changed without Department approval.

14. Operations shall be conducted by or under the supervision of: Mark S. Whittaker, (RPO), James W. Latham, Joseph J. Still, William B. House, Michael J. Benjamin, Ronald E. Versailles, or other individuals designated by the licensee's Radiation Protection Officer upon successful completion of the licensee's training program and approval by the licensee's Safety Review Board.

15. The licensee shall to the extent necessary, continue the employment of all personnel involved in the operation of the Barnwell Waste Management Facility in accordance with all requirements in the license and applicable regulations and, in the event replacement of employees becomes necessary, only individuals of comparable qualifications and experience will he hired.

16. A documented weekly inspection of site operations and the restricted area of the site for compliance with applicable conditions of this license shall be conducted by a named designee in Condition 14 or an individual appointed by a named designee and approved by the Department.

17. The transportation of radioactive materials and radioactive waste within the State of South Carolina shall be in accordance with applicable regulations of the U.S. Department of Transportation, the U.S. Nuclear Regulatory Commission, Section RHA 2.22, Department Regulation 61-63, Radioactive Material (Title A), and Department Regulation 61-83, "Transportation of Radioactive Waste Into or Within South Carolina".

18. The licensee shall maintain all records and shipment manifest pertinent to the transportation, receipt, and disposal of radioactive material at the location specified in Condition 9 of this license until authorization is given by the Department for transfer or disposal of such records.

19. The licensee shall maintain records for each shipment of waste disposed of at the site. The records shall conform with the requirements of RHA 7.32, Department Regulation 61-63, Radioactive Material (Title A).

20. A monthly site receipt and burial activities report shall be submitted no later than the 10th day following the month to the Director, Division of Radioactive Waste Management, Bureau of Land & Waste Management, S.C. Department of Health & Environmental Control, 2600 Bull Street, Columbia, South Carolina 29201.

21. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 5, 6, and 7 of this license and conduct site operations in accordance with statements, representations, operating procedures, and disposal criteria, heretofore made by the licensee or his authorized representative in application for and subsequent to issuance of S.C. Radioactive Material License No. 097, and amendments thereto.

Receipt, Acceptance and Inspection Conditions

22. The licensee shall not accept radioactive waste for storage or disposal unless the shipper has completed the required information for the waste shipment on the U.S. Nuclear Regulatory Commission Uniform Low-Level Radioactive Waste Manifest Forms 540 (Shipping Paper), 541 (Container and Waste Description), and 542 (Manifest Index and Regional Compact Tabulation) as applicable, or approved equivalent forms.

23. The licensee shall not accept radioactive waste for storage or disposal unless the generator of such waste has a valid, unsuspended Radioactive Waste Transport Permit issued by the S.C. Department of Health and Environmental Control.

24. The licensee shall not accept radioactive waste for storage or disposal unless the shipper has provided a properly executed Department Form, DHEC-803, Radioactive Waste Shipment Certification Form, Part I and II. Shipments consisting of more than 75 cubic feet or containing more than one (1) curie shall also be accompanied by a properly completed and executed Department Form, DHEC-802, Radioactive Waste Prior Notification and Manifest Form. Changes to the shipment identification number on the forms may be made by the licensee, provided that the Department is notified of the change no later than the last day of the month for which the shipment was originally scheduled. Forms shall not be carried over more than one month.

25. The licensee shall only accept radioactive waste shipments for storage or disposal which have been inspected by a representative of the Department. The licensee shall assist the Department in inspection, sampling and analysis of the waste as deemed necessary by the Department to ensure compliance with the requirements of this license.

26. Notwithstanding other conditions of this license, the licensee shall not accept radioactive waste for storage or disposal unless he has received advanced written notification of any waste shipment containing unusual hazards or potential hazards including but not limited to, physical, gaseous, chemical, pyrophoric, or excessive removable contamination on the disposal containers shipped inside casks or excessive internally contaminated casks, and unexpected high radiation levels at the disposal container surfaces.

27. The licensee shall immediately notify the Department or the Department's on-site representative of any waste shipments where a violation of applicable regulations or license conditions has been found.

28. The licensee shall notify the shipper and the Department when any shipment of radioactive waste or part of a shipment has not arrived within 60 days after the advance copy of the shipment manifest or shipping papers was received by the licensee.

29. The licensee shall notify the shipper when it has been determined that a radioactive waste shipment or part of a shipment cannot be accepted for disposal by the licensee.

30. The licensee shall acknowledge receipt of the waste within 7 days of its acceptance for disposal by returning a signed copy of the shipment manifest or shipping papers to the shipper. The licensee shall indicate on the returned copy of the shipment manifest or shipping papers any discrepancy between the waste description listed on the manifest or papers and the waste materials received in the shipment.

Waste Characteristics and Waste Form Conditions

31. The licensee shall not accept any radioactive waste for storage or disposal unless the shipper has marked each disposal container, as specified by the licensee, to identify its classification as either Class A, stable or unstable (S or U), Class B, or Class C waste, and certifies that the wastematerials have been classified and prepared in accordance with the following waste classification table:

Waste Classification Table

RADIONUCLIDES	CONCENTRATION LIMITS IN CURIES/CUBIC METER*		
Table I (long-lived)	Class A	Class.B	Class C
C-14	<0.8	<8	
C-14 in activated metal	<8	<80	
Ni-59 in activated metal	<22	<220	
Nb-94 in activated metal	<0.02	<0.2	
Tc-99	<0.3	<3	
1-129	<0.008	<0.08	
	CONCENTRATION LIMITS IN NANOCURIES/GRAM		
Alpha emitting transuranics with half-life greater than 5 years	<10	<100	
Ra-226	<10	<.100	
Pu-241	<350	<500	
Cm-242	<2000	< 20000	
	CONCENTRATION LIMITS IN CURIES/CUBIC METER*		
Table II (short-lived)	Class A	Class B	Class C
Total of all with half-life less than 5 years	< 700	> 700	
H-3	< 40	> 40	
Co-60	< 700	> 700	
Ni-63	< 3.5	< 70 <	700
Ni-63 in activated metal	< 35	< 700 <	7000
Sr-90	< 0.04	< 150 <	7000
Cs-137	< 1	< 44 <	4600

curies/cubic meter is equivalent to microcuries/cubic centimeter

A. The concentration of a radionuclide or radionuclide mixture may be averaged over the volume of the waste and, if used, the solidification agent or matrix if the waste form is a homogenous mixture. The concentration of radionuclides in filters/sealed sources encapsulated with a solidification agent or matrix shall be averaged over the volumeof the filter/sealed source not the solidification agent. The volume of packaging, containers, liners, or overpacks shall not be included in this calculation, nor shall the volume of the waste mixture be artificially increased with the addition of nondispersible solids or objects even if considered as waste.

If expressed in units of nanocuries per gram, concentration may be averaged over the weight of the waste and, if used, the solidification agent if homogenous, except in the case of encapsulation of filters which shall be over the weight of the filter. The weight of packaging, containers, liners, or overpacks shall not be included in this calculation, nor shall the weight of the waste mixture be artificially increased by the addition of heavy, non-dispersible solids or objects even if considered as waste.

B. The waste is Class A if none of the listed radionuclides are present.

C. There are no upper limits in Class B waste for the first three radionuclides listed in Table II.

D. There are no Class B values for the first nine (9) radionuclides listed; theirpresence classifies the waste as either Class A or Class C according to their concentrations.

E. The waste class for mixtures of radionuclides is determined by deriving for each radionuclide the ratio between its concentration in the mixture and its concentration limit in the table and adding the resulting ratio values for each radionuclide group. All limits used in the calculation must be for the same waste class. The sum of the ratios for each group must be less than or equal to 1.0 or the waste is of a higher classification than that used for the calculation.

F. If Class C limits are used in the calculation and the sum of the ratios for either group is equal to or exceeds 1.0, the waste is not acceptable for disposal without prior written approval from the Department.

G. If the concentration of any single radionuclide exceeds Class C values in the table,the waste is not acceptable for disposal without prior written approval from the Department.

H. Concentrations for C-14, Ni-59, Ni-63, and Nb-94 in activated metal must be evaluated for any irradiated metal component, filters and filter material associated with spent fuel pools.

I. Waste containing radium may be accepted only if the requirements of condition 44 of this license are met.

32. A. Unless otherwise specified in this license, the licensee shall not receive any liquid radioactive waste regardless of the chemical or physical form. Absorbent materials may be placed in packages of dry, solid waste to absorb unintentional and incidental amounts of liquids. Further, liquids in the interstitial spaces of transport casks and containers shall be removed to the extent practical.

B. Solidified or dewatered radioactive waste shall have no detectable free standing liquids in excess of one-half percent (0.5%) by waste volume of non-corrosive liquids per container.

C. In lieu of the requirements of paragraph B. above, solidified or dewatered waste containing non-corrosive liquids in excess of one-half percent (0.5%) by waste volume, and less than on percent (1%) non-corrosive liquids by waste volume, may be received and disposed of in high integrity containers approved by the Department.

33. A. Unless otherwise specified, the licensee shall only receive aqueous liquids and othe applicable waste forms which have been solidified or otherwise stabilized with one of the following solidification media:

a. Vinyl Ester Styrene
b. Cement
c. Bitumen (see Subparagraph E. below)
d. Vinyl Chloride

B. Solidification media and processes used to stabilize Class A aqueous liquids and other Class A wastes containing isotopes with greater than five (5) year half-lives having a total specific activity if all these isotopes of 1 microcurie/ cubic centimeter or greater, and all applicable Class B and C waste, shall meet and have been evaluated in accordance with the "Stability Guidance" requirements of the U.S. Nuclear Regulator Commission's Waste Management Division, Technical Position on Waste Form, (Revision 1), dated January 1991, or other evaluation criteria or methods specifically approved by the NRC or the Department.

C. Solidified Class A aqueous liquids and other applicable waste forms with a specific activity of less than 1 microcurie/cubic centimeter, shall meet the requirements of the "Solidified Class A Waste Products" of the NRC Technical Position on Waste Form, (Revision 1) dated January 1991.

D. other solidification media and processes shall be acceptable for which a topical report has been prepared and received approval from the U.S. Nuclear Regulatory Commission with concurrence from the Department or approval by the Department.

E. The licensee shall only receive for disposal, full formula, oxidized bitumen (asphalt) solidified waste, which is a free standing monolith as received for disposal, and certified as such by the waste generator.

34. Except as specifically provided in this license, the licensee shall not accept liquid radioactive waste packaged in absorbent materials, or where absorbent materials have been used to absorb liquids rather than properly solidified with an approved media.

35. Regardless of the waste classification of Condition 31, and unless otherwise authorized by the Department, the licensee shall not receive evaporator bottoms or concentrates, residues, sludges, or other waste which may contain free standing liquids, unless they are solidified in accordance with Condition 33, and meet the requirements as specified in Condition 32. Evaporator bottoms or concentrates which contain no free standing water and are not free flowing are acceptable for disposal when processed by a method specifically approved by the Department.

35. The licensee may receive resins and filter media in a dewatered form provided that the free standing liquid requirements of Condition 32 and the requirements of Condition 38 are met.

37. The licensee shall not receive containers of ion exchange resins or filter media (dewatered or solidified) unless records of complete radiological analyses (quantitative and qualitative) are provided. The records must specify the specific activity of each radionuclide expressed in microcuries/cubic centimeter and transuranic radionuclides in nanocuries/gram.

38. Regardless of the waste classification of Condition 31, ion exchange resins and filter media containing isotopes with greater than five (5) year half-lives having a specific activity of all these isotopes of 1 microcurie/cubic centimeter or greater must be stabilized by solidification in accordance with Condition 33 and meet the free standing liquid requirements of Condition 32.B. However, in lieu of solidification, the Department will authorize disposal of these waste forms meeting the free standing liquid requirements of Condition 32.C. in approved high integrity containers or other approved methods of stabilization.

39. Unless specifically provided otherwise, the licensee shall dispose of all classes of wastes in concrete overpacks or vaults which are approved by the Department and provided by the site operator. void spaces within the waste and between the waste and its packaging shall be reduced to the extent practic-able, but in no case shall less than eighty-five percent (85%) of the capacity of the containers be filled for all waste classes unless placed in a High integrity Container. The licensee may allow a variance from this condition in certain instances, but only after receiving a written justification from the waste generator prior to receiving the waste shipment. Variance justifications and approvals shall be maintained for review by the Department.

40. Radioactive waste containing transuranic radionuclides within the limits specified in Condition 31 are acceptable provided that the transuranic radionuclides are evenly distributed within a homogeneous waste form and are incidental to the total radioactivity. Incidental in this condition is defined as not more than one percent (1%) of the total activity. This license does not authorize the receipt of disposal of components or equipment primarily contaminated with transuranic radionuclides on vehicles, equipment, or components, with contamination limits in excess of those specified in Condition 55.

41. Household or industrial smoke or gas detectors containing Americium-241 foils which may exceed the transuranic radionuclide limit specified in Condition 31 of this license may be accepted for disposal provided the entire detector is received for disposal.

42. The licensee shall not receive or dispose of sealed sources or special form radioactive materials containing more than 5 curies of radioactive material with half-lives greater than 5 years except in a container which provides long term containment. Such containers are subject to approval by the Department. Irradiated metal components which have similar characteristics of special form radioactive materials are subject to Department review for disposal container requirements.

The licensee may accept the following sealed sources and maximum total activities provided that the sources are encapsulated with a minimum of four (4) inches of cement on all sides having a minimum compressive strength of 2,500 pounds per square inch.

Radionuclide	Maximum Total Activity (microcuries)
C-14	100
Ni-59	100
Nb-94	0.01
Tc-99	10
1-129	0.01
Radionuclides in Condition 31. Table 11	10,

43. The licensee shall not receive toluene, xylene, dioxane, scintillation liquids which exhibit hazardous properties or other organic liquids or solids with similar chemical properties except as specified below:

A. Containers which have contained any of the liquids mentioned above are acceptable for disposal after treatment as specifically authorized by the Department.

B. The ash and/or residue from the incineration of these wastes are acceptable in accordance with Condition 45 of this license.

44. Unless otherwise authorized by the Department the licensee shall not receive any radioactive waste containing Radium except for:

A. Radium contained in solid homogeneous waste forms in which the Radium activity is incidental (incidental is defined as not more that one percent of the total activity) and the concentration of Radium has not been technologically enhanced or,

B. Radium contained in the following devices: self-luminous dials, hands of dials, timepieces, compasses, and electron tubes provided that the entire device is received and buried, or

C. Radium contained in biological research waste, or

D. Radium sources specifically approved by the Department.

45. The licensee shall not receive radioactive waste in the forms of incinerator ash or powder which may be dispersible unless solidified with a media specified in Condition 33 of this license, or packaged to prevent dispersion as specifically approved by the Department. In lieu of solidification, these waste forms may be received in high integrity containers approved by the Department, provided the waste is rendered nondispersable with a binding matrix.

46. Radioactive waste containing chelating agents between 0.1 percent and 8 percent by weight in the waste as received for disposal shall be in High Integrity Containers or shall be stabilized by solidification with a media specified in Condition 33 of this license or an alternative method specifically approved by the Department.

47. The licensee may only receive gaseous radioactive materials of Krypton 85, Xenon 133, and Tritium for burial provided they meet the following criteria:

A. For Krypton 85 and Xenon 133:

a. Burial containers must be U.S. Department of Transportation specification cylinders or U.S. Nuclear Regulatory Commission approved sealed sources.

b. Internal pressure of containers may not exceed 1.5 atmospheres.

c. Total activity of containers shall not exceed 100 curies each.

B. For Tritium:

a. Only sources approved by the U.S. Nuclear Regulatory Commission or an

Agreement State may be received for disposal.

b. The source/device must be received intact.

c. The internal pressure of the source/device shall not exceed 1.5 atmospheres.

d. Sources/devices must be packaged to prevent breakage.

d. The maximum activity per disposal container shall not exceed 1000 curies.

f. Devices requiring stabilization based on waste classification (using the volume of the source/device only) must be placed in a high integrity container or encapsulated with an appropriate stabilization media.

48. A. Unless otherwise authorized, the licensee shall not receive for storage nor disposal any mixed low-level radioactive waste defined as waste that satisfies the definition of low-level radioactive waste specified in the Low-Level Radioactive Waste Policy Amendments Act of 1985 (P.L. 99-240), and contains waste that either (1) is listed as hazardous waste in Subpart D, 40 CFR 261, or (2) causes the waste to exhibit any of the hazardous waste characteristics identified in Subpart C, 40 CFR Part 261.

B. The licensee may however receive waste that has been treated by acceptable methods to render it nonhazardous and therefore not subject to the jurisdiction of the Resource Conservation and Recovery Act (RCRA). Waste which may contain discrete quantities of hazardous or toxic materials may be evaluated "or disposal by the licensee and such evaluations provided to the Department for consideration of approval.

49. The licensee shall not receive radioactive waste that is readily capable of detonation or of explosive decomposition or reaction at normal pressures and temperature, or of explosive or exothermic reaction with water.

50. The licensee shall not receive radioactive waste which contains or is capable of generating quantities of toxic gases, vapors, or fumes harmful to persons transporting, handling or disposing of the waste. This does not apply to radioactive gaseous waste packaged in accordance with Condition 47 of this license.

51. The license shall not receive or dispose of any pyrophoric material or flammable solids. These materials contained in waste shall be treated, prepared and packaged to be nonflam mable and the final waste form rendered nonpyrophoric and nonflammable prior to transportation and receipt.

52. The licensee shall not receive or bury oil or petroleum based materials in any physical form. However, this does not prohibit the receipt and disposal of waste containing incidental or trace amounts of oil or petroleum based materials which have been absorbed, provided that the amount of absorbed oil and petroleum based materials does not exceed one percent (1%) by waste volume in a container.

53. The licensee shall not receive radioactive waste containing hazardous biological, pathogenic, or infectious material unless treated to reduce to maximum extent practicable the potential hazard from the materials. In addition, radioactive waste containing biological, pathogenic, or infectious material shall be doubly packaged in new or properly recertified containers which meet the general packaging requirements of DOT as follows:

A. First, the inner container having a capacity of 55-gallon or less shall have a water tight liner at least 4 mils thick hermetically sealed after filling.

B. The biological material shall be thoroughly layered in the inner container in a ratio of thirty (30) parts biological material to at least one (1) part slaked lime and ten (10) parts absorbent, which shall be agricultural grade 4 vermiculite or medium grade diatomaceous earth, or other adsorbents that have received approval from the Department by volume. The addition of formaldehyde is strictly prohibited.

C. The closure on the inner container shall be a standard lid with securely attached ring and bolt. Lever locks are not acceptable.

D. Unless otherwise authorized by the Department, the outer container, which shall have avolume of at least 1.5 times the inner container shall be filled initially with at least 4 inches of absorbent material, specified in B., the inner container in an upright position, and the remaining volume filled with the absorbent material, then securely closed 23 and properly sealed.

54. Unless otherwise authorized by the Department, the licensee shall receive Special Nuclear Material (SNM) as authorized in Conditions 5, 6, 7, and 8 of this license in 55 gallon or larger containers only. Any SNM shipment in which there is evidence that SNM is missing or that the waste packages have been tampered with in transport shall be received by the licensee and safely stored pending notification to the Department. The licensee shall not dispose of such packages unless authorized by the Department.

Contamination Limit Conditions

55. For receipt at the Barnwell Site, all shipments shall comply with contamination control limits as prescribed in U.S. Department of Transportation Regulations, 49 CFR 173.443.

Enclosed radioactive material transport vehicles used solely for transporting radioactive materials and marked "For Radioactive Material Use Only" and accessible surface of transport casks and trailer shall not be released from the site if contamination limits exceed the following:

A. Fixed contamination of 10 mR/hr on contact with the interior surface or 2 MR/hr at 1 meter from the interior surface.

B. Removable contamination of 2200 dpm/100 sq. cm. Beta-gamma or 220 dpm/100 sq. cm. Alpha. This applied to interior and exterior surfaces.

C. Fixed contamination of 0.5 mR/hr on contact with any exterior surface.

Internally contaminated (fixed or removable) shipping casks released from the site are subject to applicable shipping regulations of the U.S. Department of Transportation. The licensee shall also inform the recipient of such casks in advance of the contaminated nature of the cask. Records of such notifications shall be retained for review by the Department.

56. Vehicles used solely for transporting radioactive material and are not marked "For Radio active Material Use Only" shall not be released from the site if the contamination limits exceed the following:

A. Fixed contamination of 0.5 mR/hr at any accessible surface.

B. Removable contamination of 2200 dpm/100sq. cm. Beta-gamma, or 220 dpm/100sq. cm. Alpha.

57. Vehicles or items for unrestricted use shall not be released from the site if the contamination limits exceed the following unless specifically authorized by the Department:

A. Fixed contamination of 0.1 mR/hr at any accessible surface.

B. Removable contamination of 220 dpm/100sq. cm. Beta-gamma, or 22 dpm/100sq. cm. Alpha.

58. The licensee shall perform decontamination on vehicles, equipment, or components, with contamination limits in excess of those specified in Condition 56 in a controlled environment.

59. The licensee shall not use its vehicle wash-down facility for any vehicles or equipment with removable contamination limits in excess of those specified in Condition 56 unless specifically approved by the Department.

General Packaging Conditions

60. All radioactive waste shall be packaged and loaded in accordance with applicable U.S. Department of Transportation Regulations, U.S. Nuclear Regulatory Commission Regulations 10 CFR Part 71, the requirements of this license, and the disposal site criteria.

61. Unless otherwise authorized, all radioactive waste shall be received and buried in closed containers. Containers which have been altered, and solidification or encapsulation media intended to serve as containers or container closures, are not acceptable unless approved by the Department. Loose radioactive waste and solidification residuals within shipping casks are prohibited.

62. The licensee shall not receive any package to be used as the final burial container that is corroded to the point of degradation or damage. Any package used as the final burial container shall be of such material construction that there will be no significant chemical, galvanic, or other reaction among the packaging components, or between the packaging components and the package contents.

63. The licensee shall, to the extent practicable, repair or repackage any damaged package used as the final burial container if such packages are approved for acceptance by the Department.

64. Prior to burial, the licensee shall, to the extent practicable, remove all liquids from waste packages found in excess of allowable limits if such packages are approved for acceptance by the Department.

65. The licensee shall not receive shipments of radioactive materials unless appropriate lifting devices of sufficient length has been provided and securely attached to containers and palletized shipments within a cask.

66. The licensee is not authorized to open any packages at its facility, except for the following:

A. For purposes of repairing or repackaging damaged containers.

B. For purposes of inspecting to insure compliance with this license.

C. For purposes of returning outer shipping containers.

D. For purposes of confirming package contents.

Site design, Construction and Maintenance Conditions

67. Construction of waste burial trenches shall be in accordance with CNSI Procedure S20-AD008, "Trench Construction" Class A waste trenches will be constructed in accordance with Drawing No. B-215-D-0004, "Class A Trench Construction Details." Class B/C waste trenches will be constructed in accordance with Drawing No. B-215-D-0007, "Class B/C Trench Construction Details." Any changes to these drawings, specifications, or procedures must have approval from the Department before implementation.

68. The licensee shall not begin construction of any trench prior to approval of the Department as to location, trench bottom elevation and intended use.

69. The licensee shall not initiate burial operations in newly excavated trenches until the Department has inspected and approved the trenches. An initial inspection will be made by the Department upon completion of excavation of the trench, excavation for the infiltrate detection and monitoring system, and drainage ditches adjacent to the trench. An intermediate inspection will be made by the Department after the infiltrate detection. and monitoring system has been complete. A final inspection will be made by the Department upon completion of construction. Trench backfill and completion shall be performed in accordance with CNSI Procedure S20-AD-008, "Trench Construction."

69. Construction of slit trenches shall be in accordance with CNSI Drawing No. B-215-D-0011, "Slit Trench Construction Details." Trench backfill and completion shall be performed in accordance with CNSI Procedure S20-AD-008, Trench Construction. An initial inspection shall be made by the Department at the completion of excavation, and final inspection shall be made at the completion of construction before burial begins.

71. A. Backfilling shall be performed for each trench design in accordance with CNSI Procedure S20-AD-008. Completed trenches shall at no time be used for stockpiling large volumes of earth not withstanding provisions for a final grading plan.

B. The licensee shall design trench covers to minimize to the extent practicable water infiltration, to direct percolating or surface water away from the disposed waste, and to resist degradation by surface geologic processes and biotic activity.

72. Open trenches to include trenches under construction and partially filled trenches shall be protected to prevent runoff water from entering trenches. Radioactive waste shall not be placed into trench areas where water has accumulated. Burial of radioactive waste into trenches with unusual amounts of water shall immediately cease until the origin of water has been determined and corrective action taken.

73. The licensee shall use proper surface water management techniques on the site to insure that:

A. Erosion is minimized.

B. Surface runoff is directed away from the trenches.

C. Accumulation of standing water is minimized.

D. Standing water in the immediate disposal area is prevented.

73. All monitoring wells, sumps, shall be sufficiently capped or covered to prevent the introduction of extraneous material or infiltration of water. All well and sump pipes shall be protected from damage.

75. The licensee shall, at least monthly, perform an inspection of completed trenches and capped areas in accordance with CNSI Procedure S20-OP-007, "Completed Trench Inspection Procedure", to ascertain any erosion, settling, cracking, subsidence, or loss of ground cover grasses and make corrections immediately. Documentation of the inspection findings and all repairs even if the repairs were performed as a routine maintenance function shall be made and incorporated into a permanent record and submitted with the stabilization plan for final site closure.

76. The licensee shall initiate closure and stabilization measures as each trench is filled and covered. Interim or final grades shall be established at no more than one year following final trench burial operations. Completed trenches shall be continuously and properly maintained to control erosion. Active waste disposal operations must not have an adverse effect on completed closure and stabilization measures.

77. The licensee shall use any reasonable means, including but not limited to fencing and security personnel, to prevent unauthorized entry into the restricted area of the site.

78. The boundaries and locations of each disposal trench shall be accurately located and mapped by means of a land survey. Temporary trench boundary markers and trench identification markers shall be erected upon completion of backfill operations until permanent markers are installed.

79. A series of markers, one at the end of each completed trench and on each corner, shall be installed upon completion of the seeding of trench covers. End monuments shall be constructed of granite. Trench corner markers shall be constructed in accordance with CNST Drawing No. B-215-C-0010. The following information shall be reported to the Director, Division of Radioactive Waste Management, Bureau of Land & Waste Management, S.C. Department of Health and Environmental Control, 2600 Bull Street, Columbia, S.C. 29201.

A. Total activity of radioactive material in curies total amount of source material in pounds, and total amount of special nuclear material in grams in the trench.

B. Date of completion of the burial operations; and

C. Volume of waste in the trench.

Burial Operation Conditions

80. Unless specifically authorized by the Department, the licensee shall not exhume previously buried waste.

81. All waste shall be placed in vaults which will provide additional structural stability. Structural evaluations for large components may be submitted to the Department for review and with concurrence from the Department will not require disposal in a vault. The licensee shall construct the vaults in accordance with procedures, drawings, standards, and a quality assurance plan that have received approval from the Department.

82. The disposal trenches and vaults shall be designed and constructed to meet the following objectives:

A. to minimize the migration of water onto the disposal trench.

B. to minimize the migration of waste or waste contaminated water out of the disposal units.

C. to detect water or other liquids in the trenches.

D. to provide for temporary collection and retention of water and other liquids for a time sufficient to allow for the detection and removal or other remedial measures without the contamination of groundwater or the surrounding soil.

E. to facilitate remedial methods without disturbing other disposal trenches.

F. to provide reasonable assurance that the waste will be isolated for at least the institutional control period.

G. to prevent contact between the waste and the surrounding earth, except for earthen materials used for backfilling within the disposal unit.

83. Wastes designated as Class C pursuant to Condition 31 of this license, shall be disposed of so that the top of the waste is a minimum of 5 meters below the top surface of the cover or shall be disposed of with intruder barriers that are designed to protect against an inadvertent intrusion for at least 500 years. Such intruder barrier designs must be specifically approved by the Department.

84. The licensee shall handle and emplace packages of radioactive waste in disposal trenches in such a manner that maintains packaging integrity during handling, emplacing, and sub sequent backfilling. Waste packages deposited in trenches shall be protected from any adverse operations which may cause damage to them.

85. The licensee shall emplace disposal vaults in such a manner to minimize voids between vaults and permit voids between vaults to be filled with earth to reduce future trench subsidence.

86. The licensee shall be a "Registered User" of all licensed casks delivered to the site containing radioactive waste for disposal.

87. At least one health physics technician shall be present during all waste handling, offloading, and disposal operations.

88. The licensee shall maintain radiation levels at the edge of the open trenches at or below 100 mR/hr.

89. Licensee personnel shall wear appropriate protective clothing, apparatus, and gloves at all times while handling or disposing of radioactive waste.

90. Vaults shall be covered within six (6) months of being filled with waste unless otherwise approved by the Department.

91. The licensee shall bury containers of Krypton 85 and Xenon 133 gaseous radioactive materials in upright positions within concrete overpacks or vaults. Each gas container shall be disposed in different overpacks or vaults unless otherwise authorized by the Department.

92. Unless specifically authorized, the licensee shall not store any package containing radioactive waste for a period greater than six months from the date of receipt of the package prior to burial. Radioactive waste shall not be stored in the trench area or an open environment for a period greater than ten (10) days from receipt, and shall be protected from damage and inclement weather conditions.

Environmental Surveillance Conditions

93. The licensee shall conduct an on-site monitoring and environmental monitoring program capable of detecting the potential contribution of radioactive material and hazardous constituents from the site to the environment. The monitoring program shall be performed in accordance with CNSI Procedures

94. Should any samples taken from the monitoring wells, or air samples reveal increases in the concentration of radioactive material which were determined prior to commencement of the burial operations, the licensee shall perform further surveys to determine whether or not the increase is due to the land burial operations. The licensee shall notify the Director, Division of Radioactive Waste Management, Bureau of Land & Waste Management, S.C. Department of Health and Environmental Control, within 48 hours of any such in creases.

95. The licensee shall submit results of all scheduled environmental sampling and analysis to the Department quarterly.

96. Monitoring wells shall be placed outside the trenches but in the trench area. Specific locations shall be determined through consultation. All wells shall be grouted, sealed and capped.

97. As radioactive material buried may not be transferred by abandonment or otherwise, unless specifically authorized by the Department, the expiration date of this license applies only to the above ground activities and to authority to bury radioactive material wastes at the site specified in Condition 9. The license continues in effect and the responsibility and authority for possession of buried radioactive material waste continues until the Department finds that the plan established for preparation of the Barnwell Site for transfer to another person has been satisfactorily implemented in a manner to reasonably assure protection of the public health and safety and the Department takes action to terminate the licensee's responsibility and authority under this license. All requirements for environmental monitoring, site inspection, maintenance and site security continue whether wastes are being buried or not.

98. The licensee shall develop a site closure and stabilization plan that addresses, as a minimum, the following performance objectives:

A. Bury all waste in accordance with the requirements of the license.

B. Dismantle, decontaminate, as required, and dispose of all structures, equipment, and materials that are not to be transferred to the site custodian.

C. Document the arrangements and the status of the arrangements for orderly transfer of site control and for long term care by the government custodian. Also document the agreement, if any, of state or federal governments to participate in, or accomplish, any performance objective. Specific funding arrangements to assure the availability of funds to complete the site closure and stabilization plan must be made.

D. Direct gamma radiation from buried wastes should be essentially background.

E. Demonstrate by measurement and/or model during operations and after site closure that concentrations of radioactive material which may be released to the general environment in ground water, surface water, air, soil, plants, or animals will not result in an annualdose exceeding an equivalent of 25 millirems to the whole body, 75 millirems to the thyroid, and 25 millirems to any other organ of any member of the public.

F. Render the site suitable for surface activities during custodial care. Planned custodial care may be limited to activities such as vegetation control, minor maintenance,and environmental monitoring. However, use of the site surface for activities such as parking lots may be planned. Final conditions at the site must be acceptable to the government custodian and compatible with its plan for the site.

G. Demonstrate that all trench elevations are above water table levels taking into account the complete history of seasonable fluctuations.

H. Eliminate the potential for loss of site or trench integrity due to factors such as erosion, surface water, wind, subsidence, and frost action. For example, an overall site surface water management system must be established for humid sites to drain rainwater and snowmelt away from the burial trenches. All slopes must be sufficiently gentle to prevent slumping or gullying. The surface must be stabilized with established short rooted grass, rock, riprap, or other measures. Trench caps must be stabilized to minimize erosion, settling, or slumping of caps.

I. Demonstrate that trench markers are in place, stable, and keyed to benchmarks. Identifying information must be clearly and permanently marked.

J. Compile and transfer to the Department complete records of site maintenance and stabilization activities, trench elevation and locations, trench inventories, and monitoring data for use during custodial care for unexpected corrective measures and date interpretation.

K. Establish a buffer zone surrounding the site sufficient to provide space to stabilize slopes, incorporate surface water management features, assure that future excavation on adjoining areas would not compromise trench or site integrity, and provide working space for unexpected mitigating measures in the future. The buffer zone must also be transferred to the custodial agency. The buffer zone may generally be less than 300 feet but not less than 100 feet.

L. Provide a secure passive site security system (e.g., a fence) that requires minimum maintenance.

M. Stabilize the site in a manner to minimize environmental monitoring requirements for the long-term custodial phase and develop a monitoring program based on the stabilization plan.

N. Investigate the causes of any statistical increases in environmental samples which have occurred during operation and stabilization. In particular, any evidence of unusual or unexpected rates or levels of radionuclide or hazardous constituent migration in or with the groundwater must be analyzed and corrective measures implemented.

0. Eliminate the need for active water management measures, such as sump or trench pumping and treatment of the water to assure that wastes are not leached by standing water in the trenches.

P. Evaluate present and zoned activities on adjoining areas to determine their impact on the long-term performance of the site and take reasonable action to minimize the effects.

99. An interim site closure and stabilization plan, assessment of current operating practices, and the long term care plan for the site shall be submitted for review one year prior to the expiration date listed in Condition 4 of this license. The plan shall be consistent with Condition 98 of this license and shall include demonstration that funds are being set aside or other measures being taken are adequate to finance site closure and long term care. The plan shall also include preliminary estimates of costs, environmental impacts, data needs, personnel needs, material and equipment needs, planned documentation and quality assurance, and detailed plan for trench locations and elevations, expected capacities, planned surface contours, and buffer zones.

For the South Carolina Department

Date of Issuance June 9, 1997 of Health and Environmental Control

Original Signed by

Virgil R. AuLry

BY:

Virgil R. Autry, Director, Div. of Radioactive waste Management